

NON-PUBLIC?: N
ACCESSION #: 9407060112
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Beaver Valley Power Station Unit 1 PAGE: 1 OF 4

DOCKET NUMBER: 05000334

TITLE: Main Transformer Bushing Failure Results in Electric Grid
Disturbance and Dual Unit Reactor Trip
EVENT DATE: 06/01/94 LER #: 94-005-00 REPORT DATE: 07/01/94

OTHER FACILITIES INVOLVED: Beaver Valley Power Station Unit 2

DOCKET NO: 05000412

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
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Nuclear Operation

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: EL COMPONENT: INS MANUFACTURER: G080
REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABST
ACT:

On 6/01/94 at 1455 hours, an insulating bushing failure on the Unit 1 Main Unit Transformer initiated an immediate generator/turbine trip followed by a subsequent reactor trip. The transformer fault initiated a voltage disturbance on the electrical grid which caused an inadvertent protective relay actuation on a circuit monitoring the 138 kilovolt (KV) AC line supplying the Unit 2 System Station Service Transformer (SSST)2A. Unit 2 4KV AC busses were being supplied by the offsite electrical grid. The loss of the 2A SSST resulted in the actuation of two reactor coolant pump underfrequency protective relays on two of the 4KV AC busses. This initiated a Unit 2 reactor trip. Both Units were stabilized in Hot Standby. The cause for this event was a single-phase insulating bushing

failure on the Unit 1 Main Unit Transformer, which initiated a voltage disturbance on the electrical grid which affected Unit 2. Corrective actions have been initiated at both Units to address identified concerns. There were no safety implications as a result of this event. The reactor protection systems at both Units actuated as designed to place the reactors in safe shutdown conditions (Hot Standby). Engineered Safety Features systems actuated as required upon receipt of the initiation signals.

END OF ABSTRACT

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Table "REQUIRED NUMBER OF DIGITS/CHARACTER FOR EACH BLOCK" omitted.

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DESCRIPTION OF EVENT

This LER discusses a dual unit event. Separate descriptions for each unit are provided.

Unit 1

On June 1, 1994, at 1455 hours, an insulating electrical bushing failure on the Unit 1 Main Unit Transformer initiated an immediate generator/turbine trip. Reactor power was at 100 percent, therefore the turbine trip initiated a reactor trip. A fire at the main unit transformer occurred due to the insulator failure. This was extinguished by the main transformer fire protection deluge system and site personnel within ten minutes. Operations personnel entered Emergency Operating Procedure, E-0, "Reactor Trip or Safety Injection." The generator/turbine trip initiated 4KV AC Bus transfers to the offsite electrical grid. During the transfer, the 1A reactor coolant pump tripped on undervoltage/underfrequency, while the 1B and 1C reactor coolant pumps remained energized. The No. 2 Emergency Diesel Generator started but was not required to load. A protective relay actuation on the 1AE 4KV AC Emergency Bus correctly delayed starting of the No. 1 Emergency Diesel Generator and the undervoltage condition cleared immediately thereafter, therefore the No. 1 Emergency Diesel Generator did not start. The main feedwater pumps tripped, initiating an automatic actuation of the auxiliary feedwater pumps. The Control Room Emergency Bottled Air Pressurization (CREBAP) system actuated by design, due to a momentary loss of power to a Unit 2 control room radiation monitor. Unit 1 and 2 share a common control room envelope and CREBAP system. Actuation signals

at either unit will cause a CREBAP initiation. At 1503 hours, a letdown system isolation occurred due to low pressurizer water level caused by the reactor coolant system cooldown following the reactor trip. At 1504 hours, the CREBAP system bottles were isolated to allow bottle repressurization. Technical Specification 3.0.3 was intentionally entered due to this isolation. At 1505 hours, Operations personnel transitioned to Emergency Operating Procedure ES-0.1, "Reactor Trip Response". The letdown system was restored at 1507 hours. The Source Range Detectors were manually energized at 1526 hours, due to one of the intermediate range detectors being out of service for a maintenance surveillance procedure and the automatic energization signal from this intermediate range detector was unavailable. The CREBAP system was restored and Technical Specification 3.0.3 was exited at 1545 hours, after achieving the required pressures in the bottled system. Main feedwater was re-established at 1604 hours. Auxiliary feedwater was restored to standby status at 1605 hours. The plant was stabilized in Hot Standby. Due to the extent of the damage to the Main Unit Transformer and the expected duration of repairs a plant cooldown to Cold Shutdown was initiated.

Unit 2

On June 1, 1994, at 1455 hours, an insulating bushing failure on the Unit 1 Main Unit Transformer initiated an immediate Unit 1 generator/turbine trip followed by a subsequent reactor trip. The transformer fault initiated a voltage disturbance on the electrical grid which caused an inadvertent protective relay actuation on a circuit monitoring the 138 kilovolt (KV) AC line supplying the Unit 2 System Station Service Transformer (SSST)2A. Unit 2 4KV AC busses were being supplied by the offsite electrical grid. The loss of the 2A SSST resulted in the actuation of two reactor coolant pump underfrequency protective relays on two of the 4KV AC busses. This initiated a Unit 2 reactor trip. By design, the underfrequency trip of two reactor coolant pumps caused a trip of the third reactor coolant pump. Core cooling was accomplished by natural circulation. The No. 1 Emergency Diesel Generator started due to an undervoltage condition sensed on its respective 2AE emergency 4KV AC bus following the loss of the 2A SSST. All respective electrical equipment supplied by the 2AE 4KV AC bus was de-energized and then re-energized by the No. 1 emergency diesel generator load sequencer. Operations personnel entered Emergency Operating Procedure E-0, "Reactor Trip Or Safety Injection." Emergency Operating Procedure E-0 was exited and emergency operating procedure ES-0.1 was entered at 1457 hours. The Control Room Emergency Bottled Air Pressurization (CREBAP) system actuated as designed due to a momentary loss of power to a Unit 2 control room radiation monitor. Unit 1 and 2 share a common control room envelope and CREBAP system. Actuation signals at either unit will cause a CREBAP system initiation. At 1405 hours,

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the CREBAP system bottles were isolated to allow bottle repressurization. Technical Specification 3.0.3 was intentionally entered due to this isolation. The 21C reactor coolant pump was started at 1515 hours, restoring forced circulation to the reactor coolant system. The Emergency Operating Procedures were exited at 1530 hours and the normal operating procedure for reactor trip recovery was entered. The CREBAP system was restored and Technical Specification 3.0.3 was exited at 1545 hours, after achieving the required pressures in the bottled system. Operations personnel stabilized the plant in Hot Standby. Following completion of all required corrective actions, criticality was achieved at 1646 hours on 6/12/94. Main Unit synchronization occurred at 0553 hours on 6/13/94,

CAUSE OF THE EVENT

The cause for this event was a single-phase insulating bushing failure on the Unit 1 Main Unit Transformer, which initiated a voltage disturbance on the electrical grid. The insulating bushing failure caused an immediate generator/turbine trip at Unit 1. The voltage perturbation on the electrical grid caused an inadvertent protective relay actuation on a circuit monitoring the 138 kilovolt (KV) AC line supplying the Unit 2 System Station Service Transformer (SSST) 2A. Unit 2 4KV AC busses were being supplied by the offsite electrical grid. The loss of the 2A SSST resulted in the actuation of two reactor coolant pump underfrequency protective relays on two of the 4KV AC busses. The loss of the two reactor coolant pumps initiated a Unit 2 reactor trip.

REPORTABILITY

Beaver Valley Units 1 and 2 reported the dual unit reactor trips to the Nuclear Regulatory Commission at 1630 hours and 1533 hours respectively in accordance with 10CFR50.72.b.2.ii, as events involving the actuation of the reactor protection system and engineered safety features systems. This written report is being submitted in accordance with 10CFR50.73.a.2.iv.

SAFETY IMPLICATIONS

There were no safety implications as a result of this event. The reactor protection systems at both Units actuated as designed to place the reactors in safe shutdown conditions (Hot Standby). Engineered Safety Features systems actuated as required upon receipt of the initiation signals.

CORRECTIVE ACTIONS

The following corrective actions have been or will be taken as a result of this event:

Unit 1

1. Operations personnel stabilized the plant in Hot Standby. A plant cooldown to Cold Shutdown was completed to facilitate forced outage repair and testing activities.
2. The 1A reactor coolant pump undervoltage/underfrequency relays were checked to verify proper setpoint operation. No deficiencies were noted.
3. The main unit transformer is being replaced with a spare transformer.
4. A post trip review of this event was conducted to identify and correct any equipment abnormalities experienced as a result of this event.

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Unit 2

1. Operations personnel stabilized the plant in Hot Standby.
2. The reactor coolant pump underfrequency relays and undervoltage relays were tested to verify proper setpoints. No deficiencies were identified.
3. The protective relay circuits monitoring the 138 kilovolt (KV) AC line supplying the Unit 2 System Station Service Transformer (SSST) 2A were checked for proper operation. The suspect relay circuit has been removed from service. Extensive testing could not determine the exact cause of the 138 KV line tripping.
4. A post trip review of this event was conducted to identify and correct any equipment abnormalities experienced as a result of this event.

DIESEL GENERATOR RELIABILITY

In accordance with NUMARC 87-00 Revision 1, Appendix D, Emergency Diesel Generator (EDG) Reliability Program, the following is a summary of the

Beaver Valley Power Station EDG Reliability Indicators as of June 30, 1994:

Unit 1

Start Failures Load Failures Total Trigger
Past 20 Site Demands 0/20 0/20 0/20 3/20
Past 50 Site Demands 0/50 0/50 0/50 4/50
Past 100 Site Demands 0/100 0/100 0/100 5/100
EDG 1-1 Past 25 Demands 0/25 0/25 0/25 4/2

EDG 1-2 Past 25 Demands 0/25 0/25 0/25 4/25

Unit 2

Start Failure Load Failures Total Trigger
Past 20 Site Demands 0/20 0/20 0/20 3/20
Past 50 Site Demands 0/50 2/50 2/50 4/50
Past 100 Site Demands 0/100 2/100 2/100 5/100
EDG 2-1 Past 25 Demands 0/25 0/25 0/25 4/25
EDG 2-2 Past 25 Demands 0/25 0/25 0/25 4/25

Previous Occurrences

There has been one similar event previously reported involving the failure of a main unit transformer. This event is detailed in Unit 1 LER 78-043.

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Duquesne Light Telephone (412) 393-6000

Nuclear Group
P.O. Box 4 July 1, 1994
Shippingport, PA 15077-0004 ND3MNO:3588

Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, Licensee No. DPR-66
LER 94-005-00

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Gentlemen:

In accordance with Appendix A, Beaver Valley Technical Specifications, the following Licensee Event Report is submitted:

LER 94-005-00, 10 CFR 50.73.a.2.iv, "Main Transformer Bushing Failure Results in Electrical Grid Disturbance and Dual Unit Reactor Trips".

L. R. Freeland
General Manager
Nuclear Operations

JGT/tlp

Attachment

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